dunetpc - Feature #19438

Add full-detector TPC ADC event display for protoDUNE

03/20/2018 08:23 AM - David Adams

Status:	Closed		**Start date:**	03/20/2018
Priority:	Normal		**Due date:**	
Assignee:	David Adams		**% Done:**	0%
Category:			**Estimated time:**	0.00 hour
Target version:				

Description

I received the following request from Tingjun on behalf of the protoDUNE DRA group:

```
I think it would be useful to display all 6 collection planes on a single display. I have attached
 a 35t event display and you can see the TPC boundaries as red lines and the APA as the horizontal
 black line. It is easy to see tracks going across multiple TPCs and across APA in this display. I
 think we should have such a display for ProtoDUNE. It is not easy to do the same for induction pl
anes because of wrapped wires and wire angles.
```

I have attached his display to this report.

I am starting to work on this.

History

#1 - 03/26/2018 10:19 AM - David Adams

As a first step, I have added the utility class WireSelector in dunetpc/dune/Geometry that allows one to select wire planes on a variety of criteria which are easily extended. Relevant here, these include the geo orientation (u, v or z), the wire angle and the width of the drift volume. The selector returns a vector of WireInfo objects which hold the wire position, the bounds of its sensitive volume, and the channel that reads it out.

With this, we should be able to make sensible plots for each of the three wire angles: 0 (collection), and +/-0.623 (induction) and exclude the small drift volumes. We may later want to add the option to also select on wire length and exclude the short induction wires in the corners.

#2 - 03/26/2018 01:42 PM - David Adams

- File wire_angle_zero.png added

- File wire_angle_p623.png added

- File wire_angle_m623.png added

I have uploaded plots that show the protoDUNE anode wires (red) and corresponding points on the the cathode planes (green) for the three wire angle views (0, +/-0.623). These are constructed from data returned by WireSelector in its unit test. These data includes a channel for each wire and so it should be straightforward to display raw or prepared ADC data.

Note the inner cathode planes appear on top of one another. I believe there should be a gap of about 12 cm. I think this is a problem in the geometry and I have reported it as [#19493](#).

#3 - 04/10/2018 11:02 AM - David Adams

- File detprep-run1-evt1-coll.png added

- File detprep-run1-evt1-ind1.png added

- File detprep-run1-evt1-ind2.png added

AdcDetectorPlotter is now producing reasonable plots. I have added fcl configurations to draw the collection and two induction views for the protoDUNE detector. In my test, I use the following to add these plots as well as those for each of the APAs:

```
services.RawDigitPrepService.DisplayTools: [
  "rawAdcPlotter",
  "preparedAdcPlotter",
  "preparedAdcDetectorPlotColl",
  "preparedAdcDetectorPlotInd1",
  "preparedAdcDetectorPlotInd2"
]
```

The last three produce the new plots.

I have attached the three plots for the first event in my 100 GeV muon sample. Note that the two induction views have ghost tracks due to some channels reading two wire segments in the same wire plane. The event display shows both.

#4 - 04/10/2018 12:17 PM - David Adams

- Status changed from Assigned to Closed

I have update the dataprep event display page (https://wiki.dunescience.org/wiki/ProtoDUNE_dataprep_event_display) to include this tool.

The tool and fcl configurations are save to dunetpc and will presumably be included in this week's release.

There is more to do including tuning the time offset and drift speed but I will leave that for later and close this report.

Files

evd_run16519_subrun1_event159.png	362 KB	03/20/2018	David Adams
wire_angle_zero.png	19.2 KB	03/26/2018	David Adams
wire_angle_p623.png	19.6 KB	03/26/2018	David Adams
wire_angle_m623.png	19.2 KB	03/26/2018	David Adams
detprep-run1-evt1-coll.png	29.9 KB	04/10/2018	David Adams
detprep-run1-evt1-ind1.png	32.7 KB	04/10/2018	David Adams
detprep-run1-evt1-ind2.png	31.7 KB	04/10/2018	David Adams